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09/491,461	01/26/2000	Paul Dagum	RAP-102	8555

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EXAMINER	
VAN DOREN, BETH	
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3623	

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/491,461	Applicant(s) DAGUM ET AL.	
	Examiner Beth Van Doren	Art Unit 3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/16/2006 has been entered.

2. In the communication of 10/16/2006, claims 1, 12, and 21 have been amended. Claims 1-21 are pending in this application.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1-21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. In order to be considered statutory, the claimed invention must produce a useful, concrete, <u>and</u> tangible result. An invention that fails to produce a tangible result is one that involves no more than the manipulation of an abstract idea. In order to be concrete, the result must be substantially repeatable or re-produce the same result. The result is useful when there is a real-world practical application.

Claims 1-21 are not useful, concrete, and tangible because they do not produce a real world result that is substantially repeatable. Claim 1 recites a computer implemented method that optimizes a multivariate representation of resources using multiple single variable

optimizations, which concludes with determining an optimal level of resources as a function of the solved maximums. However, while this value is determined, there is no recitation that this value is output, displayed, or used in the real world to accomplish a practical application. Thus, this value may merely be a starting point for future investigation or research. Further, claim 1 does not recite the specific value function utilized in the method. Thus, different users would build different models to represent the resources and arrive at completely different results, and therefore the invention is not substantially repeatable and/or does not re-produce the same results. Claims 2-11 depend from claim 1 and therefore contain the same issues set forth above.

Claim 12 is a computer implemented method that optimizes a multivariate non-linear expected value function, concluding with the step of solving the equilibrium configuration to determine the optimization. However, like claim 1, while this value is determined, there is no recitation that this value is output, displayed, or used in any real world context to accomplish a practical application. Further, claim 12 does not recite the specific value function utilized in the method. Thus, different users would build different models to represent the resources and arrive at completely different results, and therefore the invention is not substantially repeatable and/or does not re-produce the same results. Thus, claim 12 is directed to non-statutory subject matter. Claims 13-20 depend from claim 1 and therefore contain the same issues set forth above.

Claim 21 is a computer implemented method that optimizes a multivariate representation of an amount of refinements, concluding with the step of solving the equilibrium configuration to determine the optimization. However, like claims 1 and 12, while this value is determined, there is no recitation that this value is output, displayed, or used in any real world context to accomplish a practical application. Further, claim 21 does not recite the specific value function

utilized in the method. Thus, different users would build different models to represent the resources and arrive at completely different results, and therefore the invention is not substantially repeatable and/or does not re-produce the same results. Thus, claim 21 is directed to non-statutory subject matter.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 11 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 recites that the transformation of claim 10 includes an inverse Cholesky transformation of the product space. As Examiner understands it, the Cholesky is used to solve systems of linear equations. Therefore, it is not clear as to how the inverse Cholesky transformation of claim 11 specifically works with the non-linear expected value function of claim 1. Clarification is required.

Claim 15 also recites that the transforming step includes using the inverse Cholesky transform. Again, since the Cholesky is usually used to solve systems of linear equations, it is not clear as to how the inverse Cholesky transformation of claim 15 specifically works with the non-linear expected value function of claim 12. Clarification is required.

Specification

7. The appendix is objected to under 37 CFR 1.96. As stated in section 608.05 of the MPEP, only sequence listing or computer program listing may be submitted as an appendix. Applicant is requested to incorporate this essential subject matter into the body of the specification.

Response to Arguments

8. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-10, 12-14, and 16-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Hillier et al. (Introduction to Operations Research).

As per claim 1, Hillier et al. teaches a computer implemented method comprising:

optimizing a multivariate representation of resources using multiple single variable optimizations (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable), wherein the resources are used in producing a set of products, and the resources, the set of products, and their respective connectivities being represented in a product space plan (See pages 595-7, wherein the plan is

formed associated with a non-linear Expected Value Function (EVF) for optimizing a model that is associated with goods and resources (plants, people, finances)), the optimizing comprising:

converting a non-linear expected value function associated with the resources and products into a closed form expression (See pages 571, 592-4, and 596-7, which sets up the problem. See pages 568-571, which discloses a non-linear expected value function that is converted to be solved);

transforming the product space plan into a working transformed space plan, wherein the products are transformed into working elements (See pages 571, 592-4, and 596-7, which transforms the plan in a working plan, wherein the products become working elements of the objective functions);

performing a load step to form elemental blocks as a function of a single variable of the multivariate representation with elements being loaded with resources that gate production of the elements (See pages 571, 592-4, and 596-7, wherein a single variable is used and the equation is loaded with a value that controls production. The equation is solved);

examining the elemental blocks to determine if a first element has not been loaded with a corresponding first resource that gates production of the first element (See pages 571, 592-4, and 596-7);

if the examining indicates that the first element has not been loaded with the first resource, performing a re-loading step to form elemental blocks as a function of a single variable of the multivariate representation with the first element being reloaded with the first resource (See pages 571, 592-4, and 596-7, wherein a single variable is used and the equation is loaded with another value that controls production. The equation is again solved);

solving for the maximum of each elemental block over each associated single variable of the multivariate representation, wherein solving is performed by a computer (See pages 592-4, and 596-7, and 606-7, wherein local and global maximums are solved and wherein a computer is used to perform the solving); and

determining the optimum level of resources as a function of the solved for maximums (See pages 592-4, and 596-7, and 606-7, wherein the optimal level is determined).

As per claim 2, Hillier et al. discloses wherein the loading and re-loading steps result in an equilibrium configuration that provides the minimum amount of resources to produce any given amount of products across the whole plan (See pages 595-6, wherein the optimal level is determined).

As per claim 3, Hillier et al. teaches wherein the loading step further includes:

sequentially looking at each present work element (See pages 592-4, 596-7, and 606-7, wherein each work element is considered);

determining if each associated resource gates production of the element (See pages 592-4, 596-7, and 606-7, wherein a determination is made as to if a resource controls the element);

if gating occurs, then unloading the resource from a prior element if so loaded, and loading the resource onto the present element (See pages 592-4, 596-7, and 606-7, wherein if the controlling is not considered positive, a new value is loaded).

As per claim 4, Hillier et al. teaches wherein the reloading step further includes:

sequentially looking at each present work element (See pages 592-4, 596-7, and 606-7, wherein each work element is considered);

reloading each unloaded resource back onto the element (See pages 592-4, and 596-7, and 606-7, wherein the elements are reloaded);

redetermining if the element is gated by each reloaded resource (See pages 592-4, and 596-7, and 606-7, wherein a determination is made as to if a resource controls the element);

if the element is so gated, then merging the elements sharing each gating resource into a common elemental block which is a function of a single variable (See pages 596-7, which discloses the merging of the elements).

As per claim 5, Hillier et al. teaches wherein step of determining that gating occurs includes calculating a new maximum for the loaded element and determining if any remaining components further gate the maximum (See pages 594 and 596-8, which discloses loading elements and determining optimal and feasible solutions. These maximums are controlled by inputs. See also 606-7).

As per claim 6, Hillier et al. teaches wherein the step of redetermining that gating occurs includes recalculating a new maximum for the reloaded element and determining if any remaining components further gate the maximum (See pages 594 and 596-8, which discloses loading elements and determining optimal and feasible solutions. These maximums are controlled by inputs. See also 606-7. Loading the elements is an iterative process that attempts different combinations of variables).

As per claim 7, Hillier et al. discloses wherein the step of merging the elements results in an elemental block that is a sub-plan of the overall plan, but which is a function of a single variable (See pages 594 and 596-7).

As per claim 8, Hillier et al. discloses wherein the merged elements intersect at a common resource in the transformed spaces (See pages 594 and 596-7, wherein the merged elements intersect due to commonality in variables and constraints).

As per claim 9, Hillier et al. discloses wherein the expected value function represents a statistical expectation of the value function at a given resource allocation and for a given demand distribution (See at least pages 559 and 564-5, which discloses a non-linear expected value function, wherein the function represents the expectation of a value).

As per claim 10, Hillier et al. teaches wherein the transforming step involves taking a transformation of the product space to provide the working transformed space wherein the distribution induced on the resources is transformed into a distribution with zero mean and unit variance (See pages 577-578, which discusses optimizing a non-linear expected value function where the trial solution is varied by unit until the derivative is essentially zero).

As per claim 12, Hillier et al. teaches a computer-implemented method comprising:

optimizing a multivariate non-linear expected value function using multiple single variable optimizations, wherein the multivariate non-linear expected value function represents a statistical expectation of the non-linear expected value function at a given component allocation and for a given demand distribution (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable. See also pages 595-7, wherein the plan is formed associated with a non-linear Expected Value Function (EVF) for optimizing a model that is associated with goods and resources (plants, people, finances) based on an order for the goods), the optimizing comprising:

forming a plan in the product space associated with the non-linear expected value function which represents products, components, and connectivities therebetween (See pages 595-7, wherein the plan is formed associated with a non-linear Expected Value Function (EVF) for optimizing a model that is associated with goods and resources (plants, people, finances) based on an order for the goods);

transforming the product space plan to form a corresponding working space plan, with products corresponding to elements such that the distribution induced on the resources is transformed into a distribution with zero mean and unit variance (See pages 571, 592-4, and 596-7, which transforms the plan in a working plan, wherein the products become working elements of the objective functions. See pages 577-578, which discusses optimizing a non-linear expected value function where the trial solution is varied by unit until the derivative is essentially zero);

converting the associated expected value function into a closed form expression (See pages 571, 592-4, and 596-7, which sets up the problem. See pages 568-571, which discloses a non-linear expected value function that is converted to be solved);

performing a load step which loads each element with components that gate production of the element, wherein the loading step forms elemental blocks as a function of a single variable of the multivariate non-linear expected value function (See pages 571, 592-4, and 596-7, wherein a single variable is used and the equation is loaded with a value that controls production. The equation is solved. See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable);

examining the elemental blocks to determine if a first element has not been loaded with a corresponding first resource that gates production of the first element (See pages 571, 592-4, and 596-7);

if the examining indicates that the first element has not been loaded with the first resource, performing a re-loading step to form elemental blocks as a function of a single variable of the multivariate representation with the first element being reloaded with the first resource (See pages 571, 592-4, and 596-7, wherein a single variable is used and the equation is loaded with another value that controls production. The equation is again solved);

wherein the reloading step forms elemental blocks as a function of a single variable of the multivariate non-linear expected value function (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable);

merging elements that are further gated by components that were unloaded, with the loading, reloading, and merging steps resulting in an equilibrium configuration (See pages 594 and 596-7, wherein elements are merged to determine the effects on Z); and

solving the equilibrium configuration to determine the optimization of the expected value function, wherein the solving is performed by a computer (See pages 595-6, wherein the optimal level is determined and used to solve the optimization of the entire problem).

As per claims 13 and 14, Hillier et al. teaches a demand distribution including any multivariate demand distribution that is non-linear (See pages 559, 563-6, 570-1, which discloses non-linear demand distributions with non-linear objective functions). Hillier et al. further discloses using simulation to solve OR problems, the simulations using probability distributions

that include the normal distribution (See pages 900-1, 916, which discloses the normal distribution. The normal distribution is a special case within the family of elliptical distributions).

Claims 16-17 recite equivalent limitations to claims 3-4 and are therefore rejected using the same art and rational applied above.

As per claim 18, Hillier et al. teaches the equilibrium configuration includes configuring of the plan into elemental blocks which are a function of a single variable (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable).

As per claim 19, Hillier et al. teaches wherein the elemental block is maximized over this single variable (See pages 571 and 591-3, wherein the multivariate problem is reformulated as multiple functions with each function involving a single variable).

As per claim 20, Hillier et al. discloses wherein the optimum level of components to support the maximization are derived from the maximized elemental values (See pages 594 and 596-7, wherein the maximums determined support the optimal maximization of the entire problem).

As per claim 21, claim 21 recites substantially similar limitations to both claims 1 and 18 and is therefore rejected using the same art and rationale set forth above.

Allowable Subject Matter

11. Claims 11 and 15 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Krist et al. (U.S. 5,486,995) discloses optimization operating systems and manipulating one or more process variables.

Kalyan et al. (U.S. 6,826,538) discloses a revenue optimization problem which utilizes the normal distribution to optimize the model.

Krist et al. (U.S. 6,038,540) discloses optimization operating systems and manipulating one or more process variables.

White, Jr. (U.S. 6,088,676) discloses simulation and Cholesky factorization.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Beth Van Doren whose telephone number is (571) 272-6737. The examiner can normally be reached on M-F, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on (571) 272-6729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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November 9, 2006

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